$$\binom{n}{2} p^2 (1-p)^{n-2}$$

Note that the probability that zero or one or two, etc. errors occurring must be one; in other words, something must happen to the codeword! That means that we must have

$$\binom{n}{0}(1-p)^n + \binom{n}{1} p(1-p)^{n-1} + \binom{n}{2} p^2 (1-p)^{n-2} + \ldots + \binom{n}{n} p^n = 1$$

Can you prove this?

7.3 Frequency Allocations

To prevent radio stations from transmitting signals "on top of each other," the United States and other national governments in the 1930s began regulating the carrier frequencies and power outputs stations could use. With increased use of the radio spectrum for both public and private use, this regulation has become increasingly important. This is the so-called **Frequency Allocation Chart**, which shows what kinds of broadcasting can occur in which frequency bands. Detailed radio carrier frequency assignments are much too detailed to present here.

7.4 Solutions to Exercises in Chapter 7

Solution to Exercise 7.1.1

Alexander Graham Bell. He developed it because we seem to perceive physical quantities like loudness and brightness logarithmically. In other words, **percentage**, not absolute differences, matter to us. We use decibels today because common values are small integers. If we used Bels, they would be decimal fractions, which aren't as elegant.

Solution to Exercise 7.2.1

$$\binom{60}{6} = \frac{60!}{54!6!} = 50,063,860$$

Solution to Exercise 7.2.2

Because of Newton's binomial theorem, the sum equals $(1+1)^n = 2^n$.